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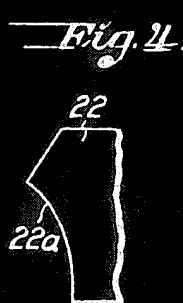
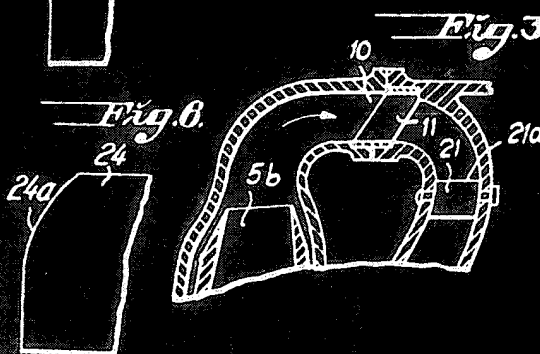
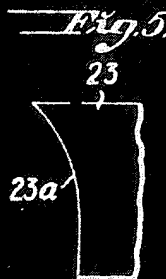
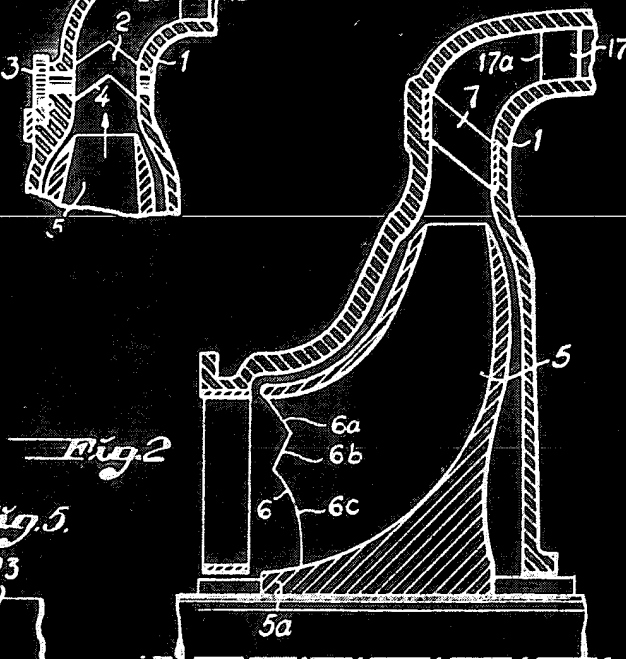
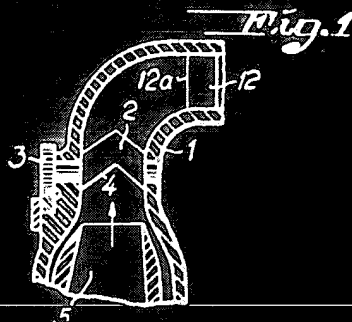
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636,290 COMPLETE SPECIFICATION

1 SHEET

This Drawing is a reproduction of the Original on a reduced scale.



H.M.S.O. (L.P.)



PATENT SPECIFICATION

636.290

Date of Application and filing Complete Specification: Jan. 7, 1948.

No. 553/48.

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* Index at acceptance: —Class 110(i), C2b(3a1: 5), C2f1, D2(b1: g1).

COMPLETE SPECIFICATION

Improvements in Diffusers for Centrifugal Compressors

1. **ALL** LYNHOLM, of Viktor Rydbergs-
gatan 33, Gothenburg, Sweden, a Swedish
subject, do hereby declare the nature of
this invention and in what manner the
same is to be performed, to be particularly
described and ascertained in and by the
following statement:—

This invention relates to diffusers for
centrifugal compressors.

10 According to the invention such a
diffuser comprises guide vanes with inlet
edges located obliquely with respect to the
direction of flow, and guide vanes having
inlet edges at right angles to said direction,
15 the last-named guide vanes being arranged
in series after the first-named guide vanes.

The first-named guide vanes may extend
radially and the last-named guide vanes
axially, or vice versa.

20 In the accompanying drawings, there are
illustrated several embodiments of the
invention.

Figure 1 shows two guide vanes located
in the outlet from a centrifugal compressor,
25 one of said vanes being adjustable.

Figure 2 is a sectional view of another
embodiment.

Figure 3 is a sectional view of a diffuser
between two stages of a multi-stage
30 compressor.

Figures 4, 5 and 6 illustrate three
different shapes of blade inlet edges.

In Figure 1, numeral 1 denotes the
diffuser of a centrifugal compressor. In
35 the diffuser, there is provided a guide
vane 2 which, in the example shown, is
adjustable by means of a gear wheel 3.
The inlet edge 4 of the guide vane is
broken, and both ends of the inlet edge
40 are located obliquely with respect to the
direction of flow of the working fluid. A
further guide vane 12 has a straight inlet
edge 12a.

In the embodiment illustrated in Figure
45 2, the inlet edge 6 of the moving blade 5
has an approximately saw-like shape.
The edge portion 6c located nearest the
periphery is inclined at an angle of 45°

with respect to the direction of flow, the
next portion 6b is deviated about 50° from
50 the direction of flow, whereas the innermost
portion 6e is continuously curved and at
the hub 5a is located substantially at right
angles to the direction of flow. The shape
described is due to the fact that the risk
55 of compression-shocks is greatest at the
radially outermost portion of the blade
where the relative velocity is a maximum.

In the embodiment according to Fig. 2,
a fixed guide vane 7 is provided in the
60 diffuser portion 1, said vane being located
at an angle of approximately 45° with
respect to the direction of flow. In this
compressor, too, there is provided a further
guide vane 17 having a straight inlet edge
65 17a at right angles to the direction of flow.

Figure 3 is a sectional view of a diffuser
between two stages of a two-stage or
multi-stage centrifugal compressor, one
moving blade of which is indicated at 5b. 70
In the diffuser 10, there is provided a guide
vane 11 which extends obliquely outwards
from the inner wall of the diffuser in the
direction of flow of the working fluid and
is located substantially 45° with respect to
75 said direction. Due to the provision of
said guide vane, it is possible to reduce the
diameter of the diffuser, as the velocity
of the fluid need not be reduced so much as
in the case of inlet edges located at right
80 angles to the direction of flow. After the
guide vane 11, as viewed in the direction
of flow, there is provided a guide vane 21
having an inlet edge 21a at right angles to
the direction of flow. 85

In the embodiments according to Figures
1 to 3 there are provided, as indicated
above, guide vanes 2, 7 and 11, respectively,
having oblique inlet edges as well as
additional guide vanes 12, 17 and 21, 90
respectively, having inlet edges at right
angles to the direction of flow. As will be
seen from the drawing, the arrangement
may be such that the vanes having oblique
inlet edges extend either in axial direction, 95
Figures 1 and 2, or in radial direction.

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Figure 3, whereas the vanes having their inlet edges located at right angles to the direction of flow extend radially or axially, respectively. The type of blades to be used is dependent upon the conditions under which the compressor is desired to be operated.

In Figures 4 to 6, there are shown three different shapes of inlet edges of blades 22, 23 and 24, respectively, for centrifugal compressors having the common feature that the deviation of the inlet edges 22a, 23a and 24a, respectively, is a maximum at the outermost portion of the blades. At the inner portions of the blades, the angle between the edge and the direction of flow is substantially 90° , whereas said angle is substantially 45° at the outer blade portions.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A diffuser for centrifugal compressors

having guide vanes with inlet edges located obliquely with respect to the direction of flow, and guide vanes having inlet edges at right angles to said direction, the last-named guide vanes being arranged in series after the first-named guide vanes.

2. A diffuser according to claim 1, in which the first-named guide vanes extend radially and the last-named guide vanes extend axially.

3. A diffuser according to claim 1, in which the first-named guide vanes extend axially and the last-named guide vanes extend radially.

4. A diffuser for centrifugal compressors substantially as described with reference to any of Figures 1 to 6 of the accompanying drawings.

Dated this 7th day of January, 1948.

ALF LYSHOLM,

Per: Boulton, Wade & Tennant,
111/112, Hatton Garden, London, E.C.1,
Chartered Patent Agents.

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